

## EXAMPLE 43

A polyurethane coating was prepared by placing 54.1 parts by weight (pbw) of the hydroxyl terminated, hydrogenated polybutadiene diol of Example 3, 0.01 pbw of dibutyl tin dilaurate and 36.0 pbw of toluene into a jar. The jar was capped and placed on a shaker for 30 minutes. Then 9.9 pbw of the isocyanate DESMODURZ-4370 (ex. Miles) were added to the jar and the jar was returned to the shaker for 30 minutes. This mixture was applied with a paint brush to a steel panel. After drying/curing for 2 weeks at room temperature, the coated film was useful as a clear, elastomeric, polyurethane coating.

## EXAMPLE 44

A polyurethane coating was prepared by placing 33.6 pbw of the hydrogenated polybutadiene diol of Example 3, 0.004 pbw of dibutyl tin dilaurate, 22.4 pbw of toluene, and 37.9 pbw of the titanium dioxide TI-PURE R-902 (ex. DuPont) into a jar. Grinding grit was then added to the jar. This mixture was rolled on a bottle roller until the  $\text{TiO}_2$  particle size was reduced to a Hegman 6 "fineness of grind". This took about 3 days of rolling the jar. The blend was filtered to remove the grinding grit. To 93.9 pbw of this blend was added 6.1 pbw of the isocyanate DESMODUR Z-4370. After thoroughly mixing in the isocyanate, the mixture was applied with a 10 mil doctor blade onto a steel panel. After drying/curing for 2 weeks at room temperature, the coated film was useful as a white, elastomeric, polyurethane coating.

## EXAMPLE 45 (HYPOTHETICAL)

An isocyanate terminated prepolymer is prepared by placing 44.3 pbw of the hydrogenated polybutadiene diol of Example 5, 5.7 pbw of a diphenyl methane diisocyanate (2/1 NCO/OH), and 50 pbw of toluene into a jar and gently rolling the jar for 2 weeks at room temperature. Then 100 pbw of this prepolymer is mixed with 50 pbw of WINGTACK 95 hydrocarbon tackifying resin (ex. Goodyear) and 100 pbw of ATOMITE calcium carbonate (ex. Thompson Weiman) in a sigma blade mixer under a dry nitrogen blanket. The material is then packaged with critical exclusion of moisture until the package is opened for use. The material is useful as a moisture-curable, polyurethane/urea sealant, caulk, or coating.

## EXAMPLE 46 (HYPOTHETICAL)

An acrylate terminated prepolymer is prepared by placing 3.5 pbw of hydroxy ethyl acrylate, 6.7 pbw isophorone diisocyanate (2/1 NCO/OH), 0.007 pbw dibutyl tin dilaurate, and 30 pbw xylene into a resin kettle. With gentle stirring, this mixture is heated to 80° C. and held for 3 hours. Then 59.8 pbw of the hydrogenated polybutadiene diol from Example 5 is added and heating is continued for another 3 hours at 80° C. to give the acrylate terminated prepolymer. This material is useful in coatings, sealants, and adhesives which are cured by free radical processes, initiated for example by peroxides or radiation.

## EXAMPLE 47 (HYPOTHETICAL)

A water-borne polyurethane/urea dispersion is prepared by charging 53.1 pbw of the hydrogenated polybutadiene diol of Example 5, 14.0 pbw of the isocyanate DESMODUR W (ex. Miles), 3.5 pbw of dimethylol

propionic acid, and 23.6 pbw of xylene to a resin kettle. This mixture is heated to 80° C. and is held for 4 hours to prepare the isocyanate terminated prepolymer. Then 2.7 pbw of triethyl amine is added to ionize the acid groups and heating is continued for another hour. This product is then dispersed in 290 pbw of water and 3.1 pbw of DYTEK A is quickly added. Heating at 80° C. is continued for another hour to chain extend the prepolymer giving the water-borne polyurethane/urea dispersion. This material is useful as a low VOC coating.

## EXAMPLE 48 (HYPOTHETICAL)

A bake-cured coating was prepared by mixing 40 pbw of the hydrogenated polybutadiene diol of Example 3, 9 pbw CYMEL 303 hexamethoxy melamine resin (ex. American Cyanamid), 1 pbw of CYCAT 600 acid catalyst (ex. American Cyanamid), and 50 pbw of toluene in a jar on a bottle roller overnight. Coatings about 2 mils thick were cast on polyester film with a 10 mil doctor blade. The coatings are cured for 10, 20, or 30 minutes in an oven at 150° C. Gel contents measured on these films were 81%, 84%, and 92%, respectively. (Gel content is the percentage of material in the coating which is insoluble in toluene after the coating is baked.) These compositions should be useful in amino resin cured coatings.

## EXAMPLE 49 (HYPOTHETICAL)

A saturated polyester resin (1.3/1 OH/COOH) is prepared by charging 55.5 g of the hydrogenated butadiene diol of Example 3, 102.3 g of neopentyl glycol, 9.9 g of trimethylol propane, 70.4 g of isophthalic acid, 61.9 g of adipic acid, 0.40 g of dibutyl tin dilaurate, and 30 g of xylene to a 500 ml resin kettle equipped with a stirrer and a partial condenser. The ingredients are carefully heated to 230° C. under a nitrogen purge. The esterification reaction is continued at 230° C. for 6 hours. After cooling to room temperature, the product is a sticky, opaque mass. The product is useful as a toughened, high solids, hydroxyl terminated, polyester resin for coatings.

We claim:

1. A polymer composition, produced by the steps of: reacting one or more compounds with the terminal functional groups on a polymer, and said polymer consists essentially of: polymerized 1,3-butadiene having a peak molecular weight between 500 and 20,000, 1,2-addition between 30% and 70%, and hydrogenation of at least 90% of the unsaturation; and one or more terminal functional groups per molecule.
2. The polymer of claim 1, wherein the terminal functional groups are selected from a group consisting of hydroxyl, carboxyl, phenol, epoxy, and amine groups.
3. The polymer of claim 2, wherein the polymer has a ratio of viscosity (poise at room temperature) to peak molecular weight raised to the 3.4 power of at most  $2.0 \times 10^{-9}$ .
4. The polymer of claim 3, wherein the polymerized butadiene has a peak molecular weight between 1,000 and 10,000.
5. The polymer of claim 4, wherein the polymerized butadiene is at least 95% hydrogenated.
6. The polymer of claim 5, wherein the ratio of viscosity to peak molecular weight raised to the 3.4 power is less than  $1.0 \times 10^{-9}$ .

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7. The polymer of claim 6, wherein the terminal functional groups consist of about two hydroxyl groups per molecule.

8. The polymer of claim 1, wherein the peak molecular weight is between 1000 and 10000.

9. The polymer of claim 8, wherein the 1,2-addition of the polymerized butadiene is between 40% and 60%.

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10. The polymer composition of claim 1, wherein the polymerized 1,3-butadiene has about two hydroxyl groups per molecule.

11. The polymeric composition of claim 10, wherein the polymerized 1,3-butadiene is reacted with compounds that form a coating.

12. The polymeric composition of claim 10, wherein the polymerized 1,3-butadiene is reacted with compounds that form a block selected from polyesters, polyamides, and polycarbonates.

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